DOCUMENT RESUME

ED 393 874 TM 024 748

AUTHOR Malinowski, Patricia A., Ed.
TITLE Issues in Assessment: Implementation.
INSTITUTION Finger Lakes Community Coll., Canandaigua, NY.
PUB DATE 95
NOTE 50p.
PUB TYPE Collected Works - General (020) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Classroom Techniques; Developmental Psychology; *Educational Assessment; Educational Improvement; Elementary Secondary Education; *Evaluation Methods; Higher Education; Nursing; *Performance Based Assessment; *Program Implementation; Reading; *Testing

ABSTRACT

This collection of articles is the third in a series on assessment produced by Finger Lakes Community College (New York). It deals with classroom assessment as an ongoing process that can be of significant value to teachers as well as to students. Assessment at the college and assessment in the classroom in general are explored. Articles include: (1) "Basic Skills Assessment: Foundation for Success" (Carol Urbaitis); (2) "Impact of Reading Ability on Students' Success in Developmental Psychology" (Marylou Boynton); (3) "The CAT's Cradle: A Metaphor for Using Classroom Assessment Techniques" (Suzanna R. Engman Benedict); (4) "Implementation of Student-Centered Instruction" (Carol Freeman and Kim Wager); (5) "Active Learning in the Classroom" (Linda Hobart and Deborah Massey); and (6) "Performance Based Outcomes Assessment in Nursing" (Ann Robinson). References follow each chapter. (Contains one figure.) (SLD)

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Issues In Assessment:

Implementation

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FINGER LAKES COMMUNITY COLLEGE
1995

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Forward

Since the Spring of 1993, *Issues in Assessment* has provided a record of the evolution of assessment efforts at Finger Lakes Community College. This ongoing record of assessment college wide and in the classroom has served as an internal mechanism for communication while providing a resource to those outside our immediate community with a commentary on our efforts. This issue continues this two fold purpose and contains information on classroom assessment projects and the changes in assessment of incoming students.

Carol Urbaitis' article presents the history of skills assessment, important changes that will impact on incoming students and directions for change over the next academic years. An underlying theme of the Urbaitis' article highlights the need for the College to develop additional courses to support the educationally disadvantaged student. The article by Marylou Boynton reports her findings regarding reading ability and success in a course and echoes the need for intensive initial assessment of students' basic skills.

The articles by Suzanna Benedict, Kim Wager and Carol Freeman, Linda Hobart and Deborah Massey, and Ann Robinson specifically address classroom and course assessment. Ann Robinson discusses performance based assessment in nursing while Susan Benedict offers a CAT for writing. In their article, Kim Wager and Carol Freeman report their collaborative learning strategies in the statistics classroom. Along the same line, Linda Hobart and Deborah Massey present a discussion of collaborative learning and assessment in a chemistry class. All of the above discussions have broad implications for classroom planning and can be readily adapted for use in college classrooms.

This issue represents the diverse efforts currently being used at the College as well as offers ideas and strategies for future efforts in the areas of student, course and degree program assessment.

Patricia A. Malinowski, Editor
Associate Professor, Developmental Studies

Dear Colleague,

This series of articles represents the third document in the *Issues in Assessment* series produced by Finger Lakes Community College. Again, it deals primarily with classroom assessment as an active on-going process that can be of significant value both to teachers as well as their students. Classroom assessment continues to be an important theme at Finger Lakes Community College as well as other post-secondary institutions. It is important, not just because of efforts to mandate educational accountability, but instead because it is student oriented. It represents the efforts of faculty themselves to assess the effectiveness of their classroom efforts and indeed in many respects is at the heart of why we are here as an institution.

I invite you to read through the articles enclosed in this issue. There are a number of innovative approaches of creative teachers who are trying to reach and teach students in new and more effective ways. You will find exciting, refreshing, creative activities of individuals who are demonstrating, through their use of classroom assessment techniques, active approaches rather than passive approaches to student learning. You will also find research about the relationship between a student's overall reading ability and college success.

Clearly, the Classroom Assessment Techniques Project that commenced several years ago at Finger Lakes Community College has had a major impact on the efforts of faculty. We continue to be impressed by and proud of these efforts.

Daniel T. Hayes, Ph.D.
President, Finger Lakes Community College

BASIC SKILLS ASSESSEMENT: FOUNDATION FOR SUCCESS

Carol Urbaitis

PLACEMENT PRACTICES

The basic skills assessment guidelines were established in 1992 and marked the emergence of a consistent and comprehensive assessment plan for students entering Finger Lakes Community College. In 1992, the goal of the plan was to establish procedures for administration of the basic skills assessment tests to all entering full- and part-time degree students, as well as to identify testing exemption criteria. The exemption criteria developed includes prior completion of an associate or baccalaureate degree, completion of a course equivalent to ENG 101 with a grade of C- or better, receipt of Advanced Placement credit for ENG 101 with a score of 3 or better, or prior completion of the basic skills assessment tests. In 1995, the policy continues to develop based upon course prerequisite requirements and a desire by the faculty to address minimum competency skills.

Where We Were

In 1991, the College administered the Multiple Assessment Programs and Services (MAPS) reading comprehension test, a writing sample developed by the Humanities Department, and an algebraic skills test developed by the Mathematics and Computing Sciences Department primarily for use by students entering degree programs in the Science and Technology Department. The MAPS test was phased out following the Spring 1993 semester, and the writing sample was updated for students entering in the Fall 1994 semester. Testing was offered on specific dates in the months preceding new student registration dates.

Where We Are

Currently, the goal of the basic skills assessment plan is to determine the students' skill levels in respect to reading, writing, and mathematics and to place students in courses for which they possess a threshold level of skills necessary for success in courses and college. The College currently utilizes:

1. The Descriptive Test of Language Skills (DTLS) by the College Board which measures the students' comprehension of both main ideas and specific details and their ability to make inferences and extract the meaning of vocabulary in context. Students' scores differentiate between those who are adequately prepared for academic work and those who may need developmental work.

2. The writing sample developed by the Humanities Department which measures a student's ability to write at the collegiate level. Students are asked to read a debate article, consider both sides of the issue, indicate which side makes more sense, and explain why. Criteria for evaluation of the samples was established by the Humanities Department during the Spring 1995 semester. The criteria includes: content, organization, style and tone, and grammar and mechanics.

3. The algebraic skills test developed by the Mathematics and Computing Sciences Department for students entering A.S. and A.A.S. degree programs that require a foundation in algebraic skills.

Testing is now offered on a consistent basis one afternoon each week and one evening each month. Additional testing dates are scheduled prior to new student registration dates to accommodate increased demand.

VALIDATING PLACEMENT TESTS

Placement data over the past four years indicates that on average 34% of the entering student population receive placement into developmental courses including GST 102, College Composition, and GST 121, Effective Reading.

To improve placement procedures, the College has been engaged in analyzing the statistical relationships between placement test scores and course outcomes through the following activities:

Development of a waiver process, effective Fall 1992, for students who received placement into GST 102 and GST 121. Students who waived enrollment in a GST course were tracked based on fall cohorts and compared with students who received placement recommendations into ENG 101, Freshman English I. The results of this study show that:

- Four percent of the entering student population waived GST 102 in the Fall of 1992; of this percentage, 23% failed to successfully complete ENG 101. Eleven percent waived GST 102 in the Fall 1993, with 16% failing to successfully complete ENG 101.
- Five percent of the entering student population waived a developmental placement recommendation in the Fall of 1992; of this percentage, 40% are no longer enrolled at the College. In the Fall 1993, 13% waived a developmental course, with a 17% attrition rate.

Based on this study, placement cut-off scores were revised for the Fall 1994.

Administration of the DTLS reading comprehension post-test to sections of ENG 101 and GST 121 during the Fall 1993 and Spring 1994 semesters to compare pre- and post-test scores for students recommended into ENG 101 or GST 121. A correlation study will be completed during the Summer 1995 to analyze effectiveness of placement scores.

Collection of data from the Fall 1994 entering student cohort for 1) students placed in ENG 101, 2) students placed in GST 102, College Composition, who waived the recommendation and enrolled in ENG 101, 3) students placed in GST 102 who took GST 102 and then enrolled in ENG 101 in the Spring 1995, 4) students placed in a college-level math course, 5) students placed in GST 142, Fundamentals of Mathematics and Algebraic Skills, who waived the recommendation and enrolled in a college-level math course, and 6) students placed in GST 142 who took GST 142 and then enrolled in a college-level math course in the Spring 1995.

The data to be studied for these groups include: 1) retention in the Fall 1994 and Spring 1995, 2) cumulative GPA in fall and spring, 3) whether the student was placed on academic probation during the fall or spring, 4) respective college-level course grades in the fall and spring, and 5) whether those who attempted ENG 101 or a college-level math course dropped it. When the data are compiled, the comparison will focus on the retention percentage, average GPA, academic probation percentage, and average ENG 101 and college-level math grades.

Preliminary ENG 101 and GST 102 placement results indicate that a total of 52 students were recommended into GST 102 and chose to waive the placement and enroll in ENG 101 instead. Of these 52, 37 (71%) completed ENG 101. The average GPA performance of the completers was 2.08 (C). These 37 students were tracked through ENG 102, Introduction to Literature. Of these 37, 18 (49%) completed ENG 102, with the average GPA performance of the completers being 1.86 (C-).

A total of 586 students were recommended into ENG 101 and enrolled in this course. Of these 586, 461 (79%) completed ENG 101. The average GPA performance of completers was 2.38 (C+). The performance of ENG 101 of students recommended for this course was 14 percent better than the performance of those recommended into GST 102 who waived the placement and enrolled in ENG 101 instead. There was little difference in the percentage of the two groups who completed ENG 101 (71% versus 79%). As a result, students who waived GST 102 and completed ENG 101 will be tracked to determine their performance in ENG 102 during the Spring 1995 semester.

Preliminary math placement results indicate that a total of five stu-

dents were recommended into GST 142 who waived placement and enrolled in a college-level math course. Their average GPA performance was 1.80 (C-). A total of 79 students were recommended into a college-level math course and took the recommended course (MAT 121, MAT 145, MAT 151, MAT 152, or MAT 271). Of these 79 students, 57 (72%) completed the course. Their average GPA performance was 2.75 (B-). The performance in college-level math courses of students recommended for those courses was 53% better than the performance of those five students who were placed in GST 142 who waived the placement and enrolled in college-level math courses instead.

PLACEMENT IMPLEMENTATION AND EVALUATION

Students' placement decisions are filed in their advising folders to be reviewed with an advisor on their registration date. Based on the implementation of the revised placement guidelines, the Division of Student Services will examine how to improve the new student "intake" process to increase students' awareness regarding 1) minimum competency skills for degree programs and courses, 2) placement guidelines, 3) academic standards, 4) statistical data regarding placement and student success; and 5) available academic support services.

To enhance the basic skills assessment plan, during the 1995/96 academic year, faculty will be asked to identify "standard" courses, describe the academic skills and knowledge they believe students must bring to the course(s) if they are to have a reasonable chance of success, and identify other methods as to how they would determine whether students have the academic skills and knowledge required to be successful in the standard course(s) -what are the characteristics they would consider.

Following the assessment of students during the 1995/96 academic year, the placement guidelines will be evaluated for effectiveness, and necessary modifications will be implemented.

FUTURE DIRECTIONS

Given our diverse student populations, the College may wish to explore the implementation of computerized adaptive testing which would assist in assessing present competencies, predict future competencies, place students in appropriate courses, and diagnose instructional needs (Wainer, 1990). The unique feature of computerized adaptive testing is the ability to accommodate wide ability ranges to enhance assessment. The testing combines computer technology with Item Response Theory which produces tests that provide accurate and efficient assessment (Smittle,

1994). In computerized adaptive testing, items are adjusted according to difficulty levels, and tests are produced that focus on each student's appropriate level. The computer updates its estimate of the student's proficiency after each response until a specified level of reliability is achieved (Wainer, 1990).

The advantages of computerized adaptive testing are many and include effective and efficient entry course placement which increases the likelihood of success; the ability for students to work at their own pace which provides an accurate assessment of skills rather than speed; students stay active during the test by working at levels at which they are challenged not discouraged; the test is specifically tailored to each student, producing multiple test forms at various levels; and students see their scores as soon as the test is completed (Smittle, 1994). The implementation of computerized adaptive testing would promote a flexible basic skills assessment plan and create a plan that is responsive to individual student needs and abilities.

The College may also wish to revisit the writing exit exam concept and consider the future implementation of a writing competency exit exam for all students completing a degree program. Research relating to existing writing competency exams shows that many institutions administer a standardized test of written English and two essays, one persuasive and one expository. Students must pass two of the exam's three parts to graduate. Arguments for and against a writing competency exam both acknowledge that the concept is more predominant at four-year institutions because of expanded credit requirements, and most students are eligible to take the exam after completing 60 credit hours. A writing exit exam establishes a common standard for all students and makes a positive statement to area employers that all students have basic writing skills before entering the world of work.

Finally, the issue of assessment and placement for mathematics needs to be investigated by the College. Goals must be selected in the context of curricular and institutional needs. For example, the College may want assessment to assist with course placement only for specific degree programs versus placement for all programs. In addition to course placement, we may also want to assist feeder high schools in preparing students by sharing assessment data (McDonald, 1989).

SUPPORT SERVICES

Research from the mid-1980's has shown that between 60 and 70 percent of all students complete remedial courses at community colleges across the nation. This data also suggested that 2.5 to 3 million students entering a community college cannot read at the college-entry level (Wiener, 1985).

Students enter Finger Lakes Community College with different achievement levels with respect to basic skills. Potentially one-third of our population is underprepared academically and are in need of remediation. Others enter the college with satisfactory academic records and test scores. A small percentage have been targeted for acceptance to the Educational Opportunity Program or the Ability-to-Benefit Program, while still others transfer to the College from different colleges and universities bringing with them another set of educational experiences.

The key element to a successful assessment plan is solid evaluation of student achievement, and the best assessment is obtained when consideration is given to both test scores and other data, such as a student's high school record. Finger Lakes has been cognizant of the need to evaluate students' test scores, writing samples, and prior academic records to arrive at final placement decisions.

A sizable percentage of our students are "at risk" in terms of their educational and economic backgrounds. Therefore, the assessment program must be applicable to the diverse array of student populations and existing instructional support services available for students who need academic support. Assessment-linked support services for basic skills improvement include the Educational Opportunity Program, Developmental Studies Department and the Writing Center sponsored by the Humanities Department.

CONCLUSION

While still evolving, the basic skills assessment plan has a defined purpose - to increase student success at the College - and continues to examine issues relating to effective placement, including:

1. specifying prerequisite skills for courses (i.e., in order to succeed, what minimal skills must the student have);
2. linking students to appropriate support services;
3. identifying who will participate in the assessment plan;
4. determining when and where services will be delivered;

5. identifying what information to collect and measure; and
6. creating a systematic follow-up process (e.g., database).

It is imperative that the College effectively communicate the goals of our basic skills assessment plan to area high schools, transfer institutions, local employers, and potential students in order to clearly articulate minimum standards for success in entry-level college courses.

Finally, the College must continue to gather outcome measures that will assist in the continued improvement of the basic skills assessment plan and include: evaluation of learning in courses (grades), course completion rates and withdrawals, and student satisfaction with courses.

References

American College Testing (1989). Action guide for the ACT ASSET program for two-year institutions: A student advising, placement, and retention service. Iowa City, IA: ACT.

McDonald, A. D. (1989). Issues in assessment and placement for mathematics. Journal of Developmental Education, 13(2), 20-23.

Roueche, J. E., Baker G. A., & Roueche, S. D. (1986). Access with excellence. New Directions for Community Colleges, 14(3), 29-40.

Scharton, M. A. (1989). Writing Assessment as Values Clarification. Journal of Developmental Education 13(2), 8-12.

Smittle, P. (1994). Computerized adaptive testing: Revolutionizing academic assessment. Community College Journal, 65(1), 32-35.

Wainer, H., Dorans, N. J., Flaugher, R., Green, B. F., Mislevy, R. J., Steinberg, L., & Thissen, D. (1990). Computerized adaptive testing: A primer. Hillsdale, NJ: Lawrence Eribaum Associates.

Webb, N., & Tripp, J. (1987). Computerized Placement Testing and Academic Placement. Paper presented at the League for Innovation in the Community College Conference "The Role of Communication Technology" (pp. 2-14). San Francisco, CA, October 25-28, 1987.

Wiener, S. P. (1985). Through the cracks: Learning basic skills. Community and Junior College Journal, 55(4), 52-54.

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The Impact of Students' Reading Ability on Their Success in Developmental Psychology

Marylou E. Boynton

Every year Finger Lakes Community College, like every other community college, admits a substantial group of students who have difficulty reading. In Spring 1994, basic skills testing showed that 41% of new students would have difficulty reading a college text. What happens to these students who are unable to read the textbook? This classroom research examines the impact of students ability to read the assigned textbook on their success in a sophomore level community college psychology course.

On admission to FLCC, students take the Descriptive Test of Language Skills (DTLS). This test score, along with a writing measure and consideration of the students' transcripts, becomes the basis for recommending student placement in Honors English, Freshman English, or developmental reading and writing courses. Every semester a number of students choose to disregard the recommendation to take developmental reading course, and take Freshman English. Follow-up data on these students indicate they should have followed the recommendation: In spring 1994, 12 students waived the recommendation to take developmental courses; the average grade in Freshman English for this group of students was 1.5 (D+). This contrasts sharply with the 3.0 (B) or better grade point average reported by 55% of FLCC students (ACT Student Opinion Survey, spring 1995). These data indicate that reading level is strongly connected to success in the required English sequence.

The DTLS follow-up data do not directly address the impact of reading level on student success in disciplines other than English where reading and writing are not a primary focus of instruction. Students do not necessarily see the need to read in all disciplines. Each semester a number of students ask whether they "really" need to buy the required text, which suggests they believe reading the text is a waste of money, and not an experience related to success in the course. This classroom research examines the impact of students' ability to read the assigned text on their success in a sophomore level course, Developmental Psychology.

On the first day of class in Fall 1994, students in three sections of PSY 200, Developmental Psychology, were administered a CLOZE exam based on a passage taken from the assigned text. The CLOZE is a mea-

sure that estimates how suitable a specific text is for instructional purposes for an individual. Unlike the DTLS, which is a general measure of students' ability to read, the CLOZE estimates their ability to read a specific source, in this case the assigned text. If reading the text is essential to the course, students whose CLOZE score indicates the text is readable should do well, whereas students whose score indicates that they cannot read the text should do poorly.

The text used in this course is Kathleen Stassen Berger's The Developing Person Through the Lifespan (Worth, 1994). The passage used for the CLOZE has a Flesch-Kincaid grade level of 18. A readability analysis of three other passages taken from different parts of the text showed that, overall, the text has a Flesch-Kincaid reading level of grade 14, college sophomore.

Method

The subjects were 88 students in three sections of Developmental Psychology. On the first day of class, the students were given a handout on which an altered passage from the text was printed. In keeping with the CLOZE procedure, the first sentence of the passage was printed completely. After the first sentence, every 5th word was deleted and a blank was inserted until there were 50 deletions. Students were asked to fill in every blank with a word they believed appropriate. They were assured that the CLOZE was an ungraded activity designed to give the instructor information about the suitability of the text for instruction. They were allowed all the time they needed to complete the CLOZE. Most finished within 25 minutes.

A CLOZE exam is scored by counting the number of times the student fills a blank with the same word that was deleted. Since there are 50 deletions, this number can be multiplied by 2 to indicate the percent of correct responses. For example, a student who correctly fills in 20 of the deleted words has a CLOZE score of 40, which means they were able to successfully anticipate 40% of the deleted words.

Results

The mean CLOZE score for all students was 40. The modal score was 42. Since a score of 40-60 indicates a text is suitable for instructional purposes, a mean of 40 with a mode of 42 indicates that, overall, those students who have made it to a sophomore course are able to read a sophomore level college text. However, there was substantial variation among individual scores which ranged from 12 to 22. This wide range indicates that

though the group as a whole can read the text, some students were unable to read the text, while others found it too easy.

One goal of this research was to look for a relationship between students' ability to read the text and students' success in the course. Three measures were used to gauge students' success in the course: whether they finished the course, dropped the course and, if they finished, their text average and their final average. The course has 4 50-item multiple choice exams based on lecture and the text, and 3 short and one extended writing assignment. The average of the 3 highest tests counts for 30% of the final grade, and the writing assignments all together count for 60% of the course grade. 10% of the course grade is class participation.

The mean CLOZE score of the 59 students who finished the course (41.60) was higher than that of the 29 students who dropped the course (36.8). An unpaired t-test showed this difference to be statistically significant at the .03 level. The mean score of the students who finished the course was within the range (40-60) that indicates the text is suitable for instruction, while the mean score of those who dropped is below that level. This suggests a CLOZE score that indicates the text can be read by a student predicts whether the student will complete the course.

Among those students who completed the course, no relationship was found between the CLOZE score and test average or final average. Correlational analyses revealed extremely low correlation coefficients for test average (r=.218) and final average (r=.08).

Discussion

This classroom research addresses the impact of students' ability to read a text on their success in a course. Clearly the biggest impact is on course completion. In general, students who cannot comfortably read the text drop the course. Though there is a distinction between dropping a course in which reading is required and picking up another less burdensome course, and dropping out of college altogether, the findings of this investigation in conjunction with the Spring 1994 DTLS follow-up data suggest that students who cannot read at a college level will not fit into courses that require college level reading. This suggests that students' reading level should be a focus of the college's efforts to increase student retention.

Roughly half of the students who enter FLCC do not graduate. As enrollments decline, the College is becoming increasingly sensitive to the impact of student attrition. The FLCC Institutional Plan for 1995-1996 to

1997-1998 includes the objective to "develop a college-wide retention effort through enhancement of existing services, programs, and curricula, and through the development of new academic and support services." These activities do not address students' basic skills. There is mention of developing an "information-recruitment piece indicating prerequisite course recommendations per major," which suggests the College is sensitive to the connection between student preparation and completion of a curriculum. The results of this research suggest College retention efforts should consider basic skills important prerequisites to student retention.

This classroom research showed no connection between students' CLOZE scores and their test or final grades. This should not be interpreted as meaning that reading level is unrelated to success in the course; rather it appears that once a student has an adequate level of reading competence, success in the course is affected by other factors, including effort and writing skills. Roughly 60% of the items of the four multiple choice tests are based on information in the text. Students' highest three grades are averaged for 30% of their final grade. The mean student test average was 71.59. This test average is lower than mean final grade of 80.42. This is not particularly surprising, because students may revise written work (which counts for 60% of the final grade) until it meets criteria for a higher grade. This permits student who have low skills but are willing to work to have a chance to do well in the course. Audio visual resources are also indicated on the course schedule for those learners who need this type of support. Thus, while the text is an important source of background information for students, it is far from the only learning experience available to them.

REFERENCES

Finger Lakes Community College Institutional Plan: Academic Years 1995-1996 to 1997-1998. (1995). Canandaigua, N.Y.: Finger Lakes Community College, 1995.

Finger Lakes Community College Student Opinion Survey. (1995). Canandaigua, N.Y.: Office of Research and Institutional Effectiveness, Finger Lakes Community College, 1995.

Spring 1994 DTLS Pre/Post-Test Results. Memo prepared by the Center for Advisement and Personal Development. Canandaigua, N.Y.: Finger Lakes Community College, September 22, 1994.

THE CAT'S CRADLE: A METAPHOR FOR USING CLASSROOM ASSESSMENT TECHNIQUES

Suzanna R. Engman Benedict

On the first day of class my son's third grade teacher asked, "What should students act like in our classroom?" He wrote down their responses, added a few of his own expectations, and the next day the class had its own constitution written in big letters on a poster that spanned one wall of the classroom. Each student read the constitution and signed it, and because they all took part in creating the rules, they tended to follow them. They also tended to police each other, sharing the responsibility for both creating and maintaining the rules.

My son's teacher probably did not know it, but he was putting into practice a Classroom Assessment Technique (CAT). If students feel as though they have some say about what goes on in the classroom, they feel empowered, as if they have a vested interest. These agreed-upon rules create the cooperation I sometimes was missing in the classroom.

Classroom Assessment is described by Angelo and Cross in Classroom Assessment Techniques: A Handbook for College Teachers (1993) as a process that "helps individual college teachers obtain useful feedback on what, how much, and how well their students are learning" (3). As I participated in Finger Lakes Community College's CAT project, based on Angelo and Cross' book, I copied my son's teacher by having my college classes create their own rules for classroom behavior. The rules worked because I received feedback from students on what kind of classroom environment would be most conducive to learning.

The point of using CATs is that students take responsibility for their own learning. I see teaching and learning as a circle of shared responsibility, and it is unclear where teaching ends and learning begins. I came to this circle image by searching for a metaphor for CATs. I scanned my list of cat cliches: CAT in the Hat, Copy CAT, CAT's paw, CAT's meow, CAT got your tongue? Nothing seemed to work until I thought about a CAT's cradle.

Remember the child's game? It takes two to play, a bit of string, a set of agreed-upon rules, and cooperation. The two players are the teacher and the student. The bit of string is the course content—what ties us

together. The set of agreed-upon rules created problems in my teaching. Before I discovered CATs, I had been rather autocratic in deciding upon classroom rules. That created problems with classroom cooperation. I also had trouble tying the string together. Of course, I did not know I had these teaching problems until I was forced (by using CATs) to examine my teaching closely. In the past, I had written class plans with goals and behavioral objectives, but I had no formal way, beside testing, to find out if my teaching methods were helping my class obtain those goals and behavioral objectives.

CATS Forced Me to Evaluate my Teaching Critically

I like to think of myself as an innovative teacher. I try the newest techniques—collaborative learning, conferencing, portfolios— but how did I know if these techniques succeeded? Did they nod to me when I talked? (or did they nod off?) Did they take notes? Did they respond to the questions I asked? I read their body language. I gave tests. Did they pass the tests? Not always. They often said my tests were too hard, but I knew better. If they had mastered the material, they would have scored higher.

Something was missing from my teaching—part of the learning circle needed to be completed. I realized that the hole existed when I tried my first CAT. The CAT I chose, "Goal Ranking and Matching," sounded like something I already used. At the beginning of the semester, I would ask students to write five complete sentences telling me what they expected from the course. If their expectations and my expectations didn't match, they were supposed to figure it out and change their expectations. I did read and respond to a few of their expectations, but I didn't respond in a systematic way.

Angelo and Cross' CAT method involved asking more specific questions of class expectations at the beginning of the semester. I handed out a goal ranking and matching survey to my Introduction to Literature class that asked: What expectations do you have of the class? What grade do you expect to receive? How much time do you expect to spend outside of class on this course? What do you normally read during a week? As my questions got more specific, so did the answers. The next step in this CAT was to compile the responses of the survey and photocopy them for discussion. This process provided a more systematic and democratic way of deciding as a class what would be expected of students and of me. Later on in the semester, we reviewed the results of the survey and students gave me feedback about the course. I asked if it was meeting their expectations. If not, what could I do to improve the course? I received some valuable feedback about the course content and my testing procedures.

Another CAT I used in my Introduction to Literature class allowed students to create their own essay questions for a test. This CAT took much more class time than I expected, but it was worth it because their questions were much more imaginative than mine, and, in response, they wrote articulate and thoughtful answers. By preparing the test questions and thinking about the possible answers, students determined the most important aspects to study. As a teacher, I am allowed the opportunity to see what students see as the most important information. Again, the spirit of ownership and empowerment is fostered, and this creates the cooperation necessary for learning.

Another CAT I found to be helpful required students to write one sentence of feedback after a conference. I try to conference with each of my classes at least once a semester. Sometimes I need to schedule up to ten students in a row. Quite frankly, conferencing physically, mentally and emotionally drains me, and though it is frustrating when students do not show up, secretly I often am delighted because I find it hard to adjust to each new set of problems and each new personality and each new learning style every fifteen minutes. I often wonder if it is worth it. Are conferences a good way to learn? Many times students come in without even an idea of what they will be writing about when they were told to come prepared with an outline and a draft. We then spend the fifteen minutes brainstorming instead of polishing. Is this an effective use of our time?

I found out that conferencing is effective, by using a CAT. After the session, I asked students to write one sentence stating the most important point learned during the conference. I told them that their responses would be kept confidential and that I would use their feedback to help me become a better teacher. Most of their responses were not specific, but they were inspiring. They were thankful for the time alone with me, and most felt they had a clearer sense of direction and purpose in their assignments after meeting with me.

Looking Back on a Year of CATS

I participated in the CATS project during the 1993-94 school year. The meetings with other CAT participants was a bonus of the CAT project. As a newcomer to FLCC, I especially coveted this time to discuss teaching concerns and exchange ideas with faculty from a variety of disciplines. The five other faculty members involved in the project and I were supposed to be conducting an experiment in which we compared two classes, one using CATS and another in which we used our old techniques. From the discussions with other CAT participants, we discovered that we had a hard time not using the CATS in the control classroom. We also learned that it is difficult to produce "measurable" differences in the CAT classrooms. However, the immeasurable differences are many.

In reading the responses of my students, I found that they felt empowered with control of classroom procedure. They felt that their opinion counted and that I was listening to their suggestions. Their perception of my receptivity encouraged participation. In a classroom in which students are participating freely, the instructor is freed up from thinking of motivational techniques and can focus on the actual teaching of material. Students enjoy the class more. By using CATS, most students participated in most classes

The most challenging faculty development project I took part in my first year at FLCC was the CAT project. It also was the most rewarding. For one thing, it forced me not only to create class plans for my classes, but to analyze them. In my CAT logs, I also had to give reasons for using the CATS. I had to analyze the results and then I had to compare the actual results with the anticipated results. This was a much more structured way to approach class plans than I was used to, but I believe the CATS have made me a better teacher.

References

Angelo, T. A., & Cross, K. P. (1993). Classroom assessment techniques: A handbook for college teachers. 2nd ed. San Francisco: Jossey-Bass.

Implementation of Student-Centered Instruction

Carol Freeman and Kim Wager

The Mathematical Association of America (MAA) in 1991 and the National Council of Teachers of Mathematics (NCTM) in 1989 mandated reform in the way statistics is taught at all levels. This was partially due to the fact that technology was now available. More importantly, there was the realization from educational research that students learn mathematics more effectively in an active learning environment, rather than in a passive one.

Both the MAA and NCTM called for the following shift in statistics education: "Statistics instruction should shift from lecture-based classes emphasizing learning mechanical skills, to student-centered courses emphasizing application, understanding and communication." Supporting this position, it is the opinion of many mathematics teachers that the focus of a statistics course should be to help the student in the process of learning how to ask appropriate questions, how to collect data effectively, how to summarize and interpret that information and how to use statistical inference to make decisions. The students we teach today will spend most of their lives living and working in a technological environment dependent on statistical reasoning. We must be gearing our statistics classes to the needs of the citizens of the twenty-first century.

Until we initiated the changes toward active learning in our statistics classes, most of the statistics sections at FLCC were lecture-based set in a passive learning environment. In the past, students were being fed artificial textbook data that was of little, if any, interest to them. The way statistics was taught previously left students on their own to make the connection between what was learned in the classroom and any practical application in their own lives. Seldom was this connection realized by the students.

We strongly feel the statistics courses at Finger Lakes Community College must be student-centered with a particular focus on classroom activities, meaningful projects, and the use of technology. As a result of our shift in focus toward an active learning environment, changes in student assessment were necessitated. This article addresses our experiences over the past year in transforming the way statistics is taught at FLCC.

In the Spring semester of 1993-94 academic year, we received a

Development of Innovative Learning Experiences (DILE) Projects grant for developing and implementing the teaching of statistics through projects and technology and we dove head first into the revamping of the curriculum, pedagogical approaches, and assessment techniques of MAT 121, Statistics I, and the implementation of these that same semester.

First, we organized the course content according to concepts rather than chapters in the text. We listed the underlying themes that should be spiraled throughout the course and mapped out how all the concepts were related and build upon each other. We then created activities/projects using a cooperative learning environment, as a substitute for lecture, to facilitate student learning and retention of these concepts. We tackled the issue of assessment since we wanted the students' course grade to be indicative of their group as well as individual performance. In the process of designing our course grading policy, we tried to fairly assign course grades to students based on an individual and group grading system. We decided on 40% of the final grade allocated to group performance and 60% based on individual performance. We also knew we wanted to alleviate student fears that "working within a group could ruin my grade" and our fears that "students may slide through our course with a grade that is not indicative of their level of understanding and performance". The grading scale in the appendix proved to be a successful form of "grade insurance" for both student and teacher. (See Appendix A)

Since part of the grade was to be based on group work, we had to insure that students learned to work together effectively. We used the activities we had created as the vehicle to help them begin to work and learn together. Implementing these activities, which were geared toward learning the concepts, proved to be challenging because the students wanted to be told what to do rather than think. Students were so accustomed to having had a lecture-based mathematics class that many at first resisted change. We basically had to "sell them" on the idea and we did this through our enthusiasm and positive reinforcement of their learning statistics together. Once the groups were functioning as a team, we introduced the first project where each member would earn the same group grade.

Little did we realize our frustrations and problems were just beginning! We had placed students in groups according to free time schedules and attitude toward mathematics using the results of a questionnaire distributed on the first day of the semester. In some cases, this method of group composition backfired. As a result of trials and tribulations with group dynamic difficulties throughout the semester, we developed a "checks and balances" system for group behavior modification for the Fall 1994 semester. We allowed students to form their own groups if they

could show us they could meet at least two hours outside of class per week. If students could not meet outside of class with peers, due to time constraints, that student could choose to do the project alone. So far, no one has chosen this option. This relieved us of the responsibility for their not being able to meet.

We implemented a "firing policy" for a student who would not cooperate and do a fair share of the work. (See Appendix B) We also implemented a policy where students evaluated each other's performance on the projects based, in part, on pre- assigned cooperative learning roles. (See Appendix C) This peer evaluation enabled us to measure whether or not students worked equably in the groups. This information helped us with the subjective part of assigning course grades and also aided us in working with groups that had problems functioning as a team.

Another assessment method we implemented at the beginning of the course was bi-weekly journal writing. We used this as a method of individual communication between teacher and student. (See Appendix D) We found students were receptive to writing to us about problems they were having with group or classroom dynamics. This was one way we were able to "fight small fires before they burned out of control".

In addition, we decided to implement portfolio assessment in the Fall of 1994 because we felt the students were not entirely making the crucial connection between the statistical concepts on their own and, therefore, not thoroughly understanding the concepts and how the concepts built upon each other. Portfolios historically have not been used in the mathematics classroom for assessment of student learning. We believe the traditional method of testing, alone, was not necessarily tied to the learning of mathematical concepts nor did it accurately reflect the progress of our students. We feel that the use of portfolio assessment has enabled us to shift the focus of students toward organizing, understanding, applying, and reflecting on course content, rather than on course grade. (See Appendix E) We found the experience with portfolios to be very rewarding for both teacher and student, but also extremely time consuming to evaluate. We are presently experimenting with various forms of portfolio evaluation.

Where do we go from here? Presently, we are in the third semester of implementation of a student-centered statistics course using alternative assessment techniques and two fellow department members chose to join us in this effort. We are in the process of continuing the revamping of how statistics is taught at Finger Lakes Community College by beginning to implement this student- centered model in MAT 122, Statistics II.

All in all, it has been an exhilarating experience. There were days though when we wanted to "throw in the towel", but in our "time of need" there was always that one student who said to us "thank you for making me think." We have received much positive feedback from our students and we close with some select comments.

I am personally grateful to this approach of teaching. I feel that I actually have an understanding as to what I was taught. Statistics is not a foreign language anymore.

The projects really make you learn the material. I feel that I learned more by working in a group on a project than I would learn by myself.

I thought statistics was just a bunch of numbers, but there is more to it.

Now that I am more aware I see statistics everywhere.

This math course is unlike any I have had. For this reason it is keeping my interest.

I love working in my group everyone has a different opinion and we share ideas.

Things are clicking. I am considering going on to higher levels of mathematics, something I would not have considered two weeks ago.

Working on the project is giving me a better understanding of the the course concepts. It's neat to see the things we learn in class put to use.

Group work makes everything easier to understand.

It is truly amazing how statistics affects our lives.

References

Leitzel, J. R. C. (Ed.) (1991). A Call for Change: Recommendations for the Mathematical Preparation of Teachers of Mathematics. Washington, DC: Mathematical Association of America.

National Council of Teachers of Mathematics. (1989). Curriculum and evaluation standards for school mathematics. Reston, VA: NCTM.

National Research Council. (1989). Everybody counts: A report to the nation on the future of mathematics education. Washington, D.C.: National Research Council.

Appendix A
GRADING SCALE

There is a total of 600 individual points possible and a total of 400 group points possible which gives you a total of 1000 possible points. The following grades are percentage grades, that is, 90 = 90% of the total possible points.

If the group grade is 90 - 100 and	
If individual grade is 90 - 100	A
If individual grade is 80 - 89	B- to A
If individual grade is 70 - 79	C- to B
If individual grade is 60 - 69	D- to C+
If individual grade is below 60	F to D
If the group grade is 80 - 89 and	
If individual grade is 90 - 100	B to A
If individual grade is 80 - 89	B- to A-
If individual grade is 70 - 79	C- to B
If individual grade is 60 - 69	D- to C
If individual grade is below 60	F to D
If the group grade is 70 - 79 and	
If individual grade is 90 - 100	B- to A
If individual grade is 80 - 89	C to B
If individual grade is 70 - 79	C- to B-
If individual grade is 60 - 69	D- to C
If individual grade is below 60	F
If the group grade is 60 - 69 and	
If individual grade is 90 - 100	B- to A
If individual grade is 80 - 89	C- to B
If individual grade is 70 - 79	D to C
If individual grade is 60 - 69	D- to D+
If individual grade is below 60	F
If the group grade is below 60 and	
If individual grade is 90 - 100	D to A
If individual grade is 80 - 89	D to B
If individual grade is 70 - 79	D- to C
If individual grade is 60 - 69	F to D
If individual grade is below 60	F

Appendix B
FIRING SYSTEM

RESPONSIBLE STUDENTS

- ATTENDANCE POLICY: AFTER 3 ABSENCES THE STUDENT WILL BE Q'D FROM THE COURSE.

- IF A STUDENT CAN'T COOPERATE AND DOES NOT DO HIS/HER SHARE OF THE WORK, THAT STUDENT MAY BE FIRED BY THE GROUP. IN ORDER FOR A STUDENT TO BE FIRED THERE MUST BE DOCUMENTATION OF NEGLIGENCE TO SUPPORT THE DECISION.

  TWO REASONS TO BE FIRED:

  1. FAILURE TO MEET WITH THE GROUP IN AND/OR OUT OF CLASS.

  2. FAILURE TO DO HIS/HER ASSIGNED PORTION OF THE WORK ON TIME IN AN ACCEPTABLE MANNER.

  NOTE: A PERSON CANNOT BE FIRED DUE TO DIFFERENCES IN PERSONALITY OR OPINION.

- A GROUP MEETING WITH THE INSTRUCTOR MUST PRECEDE ANY POSSIBLE FIRING. IF A FIRING IS NECESSITATED THE STUDENT WILL BE REQUIRED TO FINISH THE PROJECT WORK INDEPENDENTLY.

- IF A STUDENT WHO HAS BEEN FIRED FROM A GROUP SUCCESSFULLY COMPLETES THE CURRENT PROJECT INDEPENDENTLY, HE/SHE MAY BE HIRED BY ANOTHER GROUP IF EVIDENCE OF BEING A RESPONSIBLE GROUP MEMBER CAN BE CONVEYED TO THE INSTRUCTOR AND THE HIRING GROUP.

Appendix C
ROLES OF GROUP MEMBERS

These roles will be rotated within the group after each project is completed.

DIRECTOR

- SHIFT ATTENTION OF MEMBERS FROM GROUP MODE TO INSTRUCTOR MODE, QUICKLY AND QUIETLY
- ORGANIZE MEETING TIMES AND PLACES
- DETERMINE WITH GROUP THE AGENDA FOR MEETINGS SET WITH GROUP THE TIME SCHEDULE FOR COMPLETION OF PROJECT PARTS
- CONVEY TO THE INSTRUCTOR PROBLEMS WITH GROUP DYNAMICS ONLY AFTER THE GROUP HAS DISCUSSED AND PROPERLY DOCUMENTED PROBLEMS

  NOTE: THE INSTRUCTOR WILL ONLY ACT ON SOLVING GROUP DYNAMICS PROBLEMS WITH THE GROUP AFTER THE GROUP AS A WHOLE HAS DISCUSSED AND STATED IN WRITING THE DIFFICULTIES.
- BE SURE EACH GROUP MEMBER SATISFACTORILY "PULLS HIS/HER OWN WEIGHT" ON PROJECTS

TECHNICAL SPECIALIST

- RESPONSIBLE FOR ALL COMPUTER AND CALCULATOR WORK NECESSARY FOR PROJECT COMPLETION
- RESPONSIBLE FOR THE PROPER USE OF THE TECHNOLOGY AND SHARING THE USE AND RESULTS WITH THE GROUP
- CONVEY COMPUTER PROBLEMS TO THE INSTRUCTOR ONLY AFTER THE GROUP HAS DISCUSSED AND TRIED POSSIBLE SOLUTIONS AND HAS REACHED A "DEAD END"

RECORDER

- CAREFULLY RECORDS THE ANSWERS OF THE GROUP AND IS RESPONSIBLE FOR ANY FORMAL WRITE-UP OF CLASS ACTIVITIES FOR GROUP NOTES
- RESPONSIBLE FOR OVERSEEING WRITE-UP OF THE PROJECT ACCORDING TO STATED GUIDELINES

REFLECTOR

- WATCHES TO MAKE CERTAIN THAT EVERYONE IS PARTICIPATING AND INVITES RELUCTANT OR SILENT MEMBERS TO CONTRIBUTE

  i.e. "WHAT IS YOUR IDEA?", "DO YOU HAVE ANYTHING TO CONTRIBUTE?", "WHAT DO YOU THINK?"
- RECORDS AND ANALYZES INDIVIDUAL AND GROUP PRODUCTIVITY/ DIFFICULTIES AND BRINGS THESE TO THE GROUP FOR DISCUSSION MONITORS ROLES OF GROUP MEMBERS
- THE GROUP SHOULD USE THE COMMENTS OF THE REFLECTOR TO IMPROVE ON INDIVIDUAL ROLES AND OVERALL SUCCESS OF THE GROUP

Appendix D
JOURNAL GUIDELINES

Write at least half a page reflecting on the following:

1. Statistical concepts you learned.

   How do they relate to:
   a. The course.
   b. Your area of study.
   c. Your (possible) career.
   d. Any situation you have previously encountered.

2. Group dynamics.

   a. Things that are working well in your group.
   b. Difficulties encountered by your group.
   c. Improvements your group may need to make.

3. Classroom dynamics.

   a. Things that are working well for you in the class.
   b. Difficulties encountered by you in the class.
   c. Suggestions for improving classroom activities.

Appendix E
PORTFOLIO GUIDELINES

We see your portfolio as a purposeful collection of your course work that tells a story of your efforts, progress and achievement in Statistics I. We do not see the portfolio as just a folder of your work, but to be used as a tool to help you better understand and reflect on course content, and to help us better assess your learning.

Components of Portfolio:

1. TABLE OF CONTENTS

   This table should describe what is in your portfolio. You must reference any corrections made to your projects or assignments in this table.

2. SUMMARIZATION OF COURSE CONCEPTS

   This summary must be typed and at least two pages in length. Your summarization should reflect on HOW all the course concepts build upon each other. Explain the concepts in the sense of how they are related and build upon each other. Do not define the concepts or "reteach" them to us, but express them as ideas that have been developed over the semester.

   SUGGESTIONS:

   1. Create a diagram with attached explanations for relationships.

   OR

   2. Describe in essay form the course relationships.

3. JOURNALS IN AN ORGANIZED MANNER

4. A COPY OF YOUR THREE PROJECTS AND ANY CORRECTIONS OR IMPROVEMENTS MADE

ACTIVE LEARNING IN THE CLASSROOM

Linda Hobart and Deborah Massey

The interactive class described in this article is a form of cooperative learning, in which the role of the instructor shifts from "someone who dispenses information" to "someone who facilitates learning". Students become active rather than passive learners. Active learning is based on two pedagogical facts: 1) It is more effective and more interesting to learn in an "active" rather than "passive" process and 2) It is necessary for teachers to design their classroom strategies to maximize the values of active learning.

The constructivist theory of knowledge believes that we build on prior knowledge and that when the responsibility of learning rests on the learner, the learner will reach greater heights of learning. When the learner describes, clarifies and debates with others, the learner accrues to his or her experiences. Concepts must be acquired by building on previous knowledge rather than by rote learning or the memorization of mathematical algorithms, in order to be meaningful. The class described in this article is a General Chemistry class; however, it could be any class. Based on constructivism, it emphasizes critical thinking and problem solving in a cooperative learning setting.

For a number of years, we and our colleagues nationwide have become increasingly convinced that the General Chemistry curriculum and its mode of instruction must be radically revised if we are to have a chemically literate society in the future. Last year Linda Hobart was member of a consortium of 11 colleges which reviewed teaching strategies and curricula in General and Organic Chemistry. Based on our experiences, the consortium's findings, and the "New Directions for General Chemistry" a task force report from the American Chemical Society (ACS), we decided to adopt an active teaching and learning approach in General Chemistry at Finger Lakes Community College.

Over the last three years we had already been examining the content of the General Chemistry course, omitting some physical and descriptive chemistry needed only by chemistry majors and replacing it with topics that link chemistry with life experiences, ie. organic, environmental and biochemistry. We had already begun to identify curricular changes and teaching and learning strategies. The ACS Task Force (1994) recom-

mends, "that General Chemistry should be general and should relate to students' areas of interest and everyday experience."

Goals and pedagogy were developed to meet the workplace skills from the "SCANS" report and college skills from "College Expectations: The Report of the SUNY Task Force on College Entry Level Knowledge and Skills." Both reports emphasize that the educational experience is to prepare students to be life-long learners. Our goals are designed to prepare students for life and not limited to General Chemistry at Finger Lakes Community College. Our goals for the course state:

The student will:
- understand basic chemical concepts and how they relate to everyday experiences.
-develop problem solving and critical thinking skills.
- understand and experience how scientists use the "scientific method."
- work effectively with others in groups where individual success depends on group success.
- improve his or her presentation skills.
- be able to access information for life-long learning. (This includes use of the text books and libraries.)

After we developed goals for the course we began writing active learning modules to be used by formal cooperative learning groups. Journal writing, discussions, lectures, demonstrations, student activities, student presentations, concept mapping and new laboratory experiments supplement each module. An instructor's guide and a student guide were developed . The student's guide includes suggested review topics, required reading, questions they should be able to answer, and concepts they should be looking for when they read the text.

Each module contains Critical Thinking Questions followed by Exercises, so that students are forced to identify and apply the concepts before solving numeric problems. The modules are designed to develop habits of thinking, rather than memorizing.

Critical Thinking Questions often use the discovery approach and ask students to apply concepts to everyday problems. Topics included in the modules are carefully chosen, keeping the principle "less is more" in mind. An example of a module follows:

ENTROPY AND THE SECOND LAW OF THERMODYNAMICS
CRITICAL THINKING QUESTIONS: Require explanations.

1. Cells often create large molecules from small molecules. Is this consistent with the entropy of the molecules?

2. In the Thermochemistry Lab last semester you observed the heat transfer from a rubber band when it was stretched and when it was allowed to relax. In the polymer chapter you studied the make up of rubber and what happenned to it when it was stretched and released.

a) What did you, or would you, expect would happen in terms of heat, when the rubber band was released and why?

b) What entropy changes are taking place in both cases?

EXERCISES:

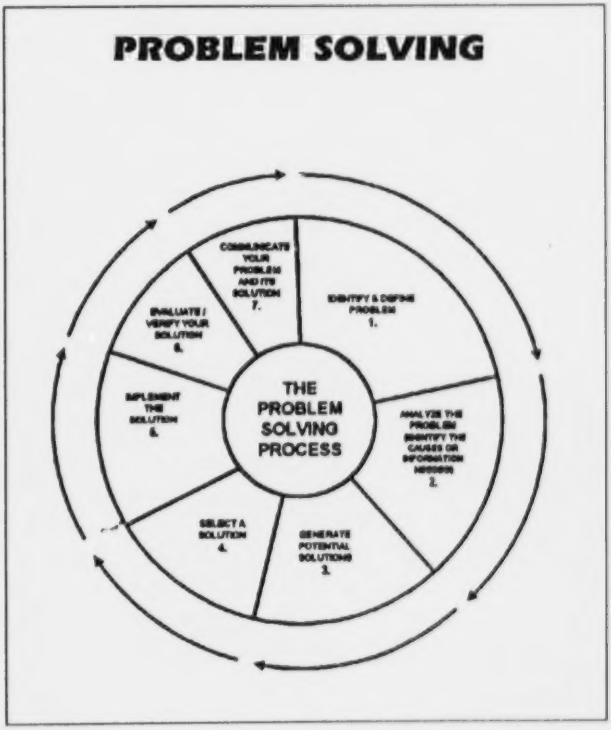
1. Which of the following involve an increase in the entropy of the system?

a) Mixing _____
b) Mending a broken watch _____
c) Precipitation of a solid from a solution _____
d) Sublimation _____
e) $CaCO_3(s) \longrightarrow CaO(s) + CO_2(g)$ _____
f) $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$ _____

Problem solving, which is a natural component of the scientific process, is introduced to the students and they are expected to apply it to all problem solving activities. A problem solving circle (below) which we modified from Xerox's problem solving wheel, is used in class and in the laboratory.
Word problems which have mathematical solutions must include: Given, Find, and Need To Know. Need To Know means what concepts must one know to be able to solve the problem. All answers must also include formulas, numbers in formulas with units, and the answer with appropriate units. Students are discouraged from using algorithms.

Our change in assessment mirrors our change in pedagogy. Tests are designed to follow the models used in the classroom and in homework assignments. They include primarily: critical thinking questions, concept maps, and exercises.

The most direct method of evaluating the project's success has been our close observation of and interaction with the cooperative learning groups as they use the modules. In addition students filled out a seven page evaluation form near the close of the first semester. The following is a summary of some of the questions:


PROBLEM SOLVING
THE PROBLEM SOLVING PROCESS
IDENTIFY & DEFINE PROBLEM 1.
ANALYZE THE PROBLEM IDENTIFY THE CAUSES OR INFORMATION NEEDED 2.
GENERATE POTENTIAL SOLUTIONS 3.
SELECT A SOLUTION 4.
IMPLEMENT THE SOLUTION 5.
EVALUATE / VERIFY YOUR SOLUTION 6.
COMMUNICATE YOUR PROBLEM AND ITS SOLUTION 7.

	strongly disagree	Percentage		strongly agree	
	1	2	3	4	5
1. This course helped me to develop					
-problem solving skills.		15	43	20	22
-critical thinking skills.	2	13	35	41	7
-team skills		7	34	30	29

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2. CRITICAL THINKING QUESTIONS					
- helped to make chemistry more meaningful.	2	11	43	26	17
- to understand the concepts better.		9	35	41	15
3. The EXERCISES helped me to solve problems better		11	22	47	20
4. Writing "need to know, given and find" helped me to solve problems better.	6	7	11	42	35

Early evidence indicates that the active learning methods we are using are successful in improving students' involvement in learning, and especially in getting students to accept responsibility for their own learning. As a result of the questionnaire, we are making the following adjustments in our teaching strategies this semester and next fall:

-Assigning and grading more homework.
-Including more information on the Student Guide sheet.
-Having students more frequently assess the effectiveness of their groups.
-Pulling the groups together more frequently and having more student presentations of their answers.
-Reducing the number of Critical Thinking Questions and Exercises to allow for more discussion time in class.
-In the fall we will be providing more support to help students adjust to cooperative learning.

We are confident that active learning will increase student comprehension of chemical concepts and prepare them for future courses and the work force. Students are responsible for their learning. Our job is to facilitate this process. More importantly, by making our classroom mirror the real world, and having students practice life-long learning skills such as problem solving, team work, accessing information, and expressing their ideas, they will make use of skills needed in the rapidly changing world.

References

Lad, B. W. (Ed.) (1994). New Directions for General Chemistry. Lancaster, PA: National Science Foundation

SUGGESTED READINGS

Bodner, G. (1991). "Why Changing the Curriculum May Not Be Enough." Journal of Chemical Education, 69, 186.

Johnson, D., Johnson, R. & Smith, K. (1991). Active Learning. Eding, MN: Interactive Book Co.

Nowak, J. D. & Gowin, D. B. (1993). Learning how to learn. New York, NY: Press Syndicate of the University of Cambridge

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PERFORMANCE BASED OUTCOMES ASSESSMENT IN NURSING

Ann Robinson
(In collaboration with M. Claire Blanton and Sharon A. Tobey)

By definition, outcomes assessment refers to the systematic measurement of what students learn. The results of instruction are gathered, analyzed' and processed to provide feedback about teaching and learning. In performance assessment, student achievement is evaluated using methods other than standardized exams. The assessment movement arrived on the post-secondary educational scene in the late 1980's. In comparison, Nursing Education has been using formal assessment procedures for decades. Internal and external forces have both contributed to the use of outcomes assessment in Nursing Programs. For example, the obligation to ensure that the graduate nurse is a safe practitioner has been and continues to be a driving force behind performance based outcomes assessment. The National League for Nursing also places a strong emphasis on outcomes assessment in program evaluation standards for accreditation.

At FLCC, assessment of nursing students is an on-going process. Students are evaluated in theoretical, laboratory' and clinical components of courses using performance outcomes assessment methods. In addition, Program Evaluation, or measuring the extent to which program goals are achieved, is also based on an outcomes model.

This article will focus on the outcomes evaluation program in Nursing and will discuss selected performance based assessment techniques. (See Illustration 1).

At the Program Level, goals of the Nursing Program were developed using the program philosophy. The faculty developed program goal statements that were realistic, observable, measurable, behavioral, and attainable (ROMBA). Writing goals in the ROMBA format is perhaps the most difficult aspect of the process, yet the most crucial, since the goal will guide the outcome statements and measures.

The first nursing program goal is cited here as an example of a behaviorally oriented goal:

> The Nursing Program will prepare nurses who apply theoretical knowledge and skills necessary for giving direct nursing care to clients with predictable, commonly occuring health problems in a structured setting within a broad , diverse geographic area.

The goal describes an authentic purpose for a Nursing Program, thus it is realistic and attainable. The goal also defines what will be done, where it will be done and how it will be accomplished.

For each program goal, measures and outcome statements were delineated by the faculty. These statements provide the faculty with parameters for goal evaluation. Sample measures (what the faculty can assess) for the aforementioned program goal included admission, retention and graduation rates. Program satisfaction and NCLEX-RN (National Council Licensing Examination for Registered Nurses) success rates were identified as additional measures. Specific outcomes (the standard by which effectiveness can be documented) for this same goal include the criteria: "The retention rate in Nursing 100 will be 85%, plus or minus 5%". (See Illustration 2).

The next step in developing an outcomes based assessment program was to delineate terminal objectives for each course, unit objectives for classroom work within each course and clinical objectives for clinical work. Each level of objectives was checked with the previous level for continuity and consistency. Teaching, learning, and evaluation are then based on these stated objectives across the nursing curriculum.

Examples of performance based assessments used to measure theoretical content mastery include oral presentations, nursing care plans, teaching plans and case studies. In performance based assessment it is essential that specific evaluation criteria is in place for any given assignment. Criteria for developing and completing assignments are given to students as part of the course outline. This same criteria is used by faculty for grading. (See Illustration 3).

Performance in the clinical area is evaluated by faculty using the clinical contract. The contract contains statements which relate to specific, behaviorally-oriented and measurable performance standards students are expected to meet. Criteria are currently evaluated as satisfactory or unsatisfactory. Critical elements must be met for satisfactory completion of the course. (See Illustration 4).

A third area where performance based assessment occurs in the nursing program, and which perhaps provides the strongest example of this type of assessment, is in the evaluation of technical skills. Competency based criteria is used by faculty to measure performance of selected skills in the college lab. The faculty have found that in most cases the less complicated the criteria, the better. Criteria that is too detailed or too specific can actually decrease problem-solving during application of the skill. A sample of skills competency criteria is provided in Illustration five. The criteria, like that for written assignments and clinical performance is "public". It is provided to students at the beginning of each course. A basic premise of performance evaluation is that students should be informed of the criteria by which they will be evaluated.

Performance based outcomes assessment has numerous advantages. It permits faculty to evaluate a larger scope of student mastery than traditional methods and to be consistent in their evaluation of performance. This is important particularly in areas where content is team taught and adjunct faculty are involved in laboratory testing and clinical teaching/supervision. Performance based assessment accurately defines what will be evaluated. Students and instructors are aware of the criteria and the expectations. This tends to decrease student anxiety to a degree since fear of the unknown is reduced. Criteria that is public, observable and measurable also affords the student the opportunity to participate in self-evaluation. The student can evaluate their own assignments as well as their clinical performance and self-growth. Comparisons with faculty result in a more complete process of assessment than when the process is initiated solely by the faculty member.

Disadvantages include the amount of time that can be involved in the development of clearly written and measurable performance criteria. Subjectivity, although controlled, is still inherent in the process and can be considered a second disadvantage.

Overall, the Nursing faculty have found that performance based outcomes assessment is an efficient and effective method for evaluating the multiple facets involved in nursing education. Using the information obtained through various assessment techniques allows for continuous improvement in the curriculum based on documented data.

Illustration 1

Performance Based Assessment Process

Program Philosophy

Program Goals

Course Terminal Objective

Unit Objectives

Unit Quizzes/Exams

Clinical Objectives

Clinical Contract

Performance Measures

Lab Competencies
Oral Presentations
Teaching Plans
Assessments
Care Plans
Case Study

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Illustration 2

Projected Program Evaluation Plan

GOAL: TO PREPARE NURSES WHO APPLY THE KNOWLEDGE AND SKILLS NECESSARY FORGIVING DIRECT CARE TO CLIENTS WITH PREDICTABLE, COMMONLY OCCURRING HEALTH PROBLEMS IN STRUCTURED SETTINGS WITHIN A BROAD AND DIVERSE GEOGRAPHIC AREA.

Measure #1	Outcome
Admission Rates	The number of students accepted into nursing will not exceed the maximum that can be accommodated based on qualified faculty, clinical placements, and post-graduate job availability.
Retention Rates	Retention rates for nursing courses will be: 85% + 5% of NUR 100 85% + 5% of NUR 101
Graduation Rates	90% + 5% of NUR 202 students will graduate 98% + 2% of NUR 203 students will graduate 98% + 2% of NUR 204 students will graduate

Plan/Method/Timeframe

- A process for screening qualified applicants from the applicant pool will be developed with the Assistant Dean of Student Affairs during the 1994-95 academic year.

- Admission rates will be monitored and evaluated by the Department Chairperson and the Nursing Admissions Committee. (ongoing)

- Job placements will be monitored and evaluated by the Department in conjunction with the Director of Research and Institutional Effectiveness thru graduate follow-up surveys. (January)

- Analysis of admission data will be presented to the Nursing Faculty for consideration and/or action. (October and March)

- Lead teachers will calculate retention rates by course at the end of each semester and report findings to the department for consideration and/or action. Begin data collection, Fall 1993.

Measure #2	Outcome
Program Satisfaction - Student - Graduate - Employers	The majority of students, graduates and employers will report 3 or greater on a 5 point scale where 3 equals satisfaction.

ILLUSTRATION 3

(10 points)

GUIDE TO PREPARATION OF CLIENT STUDY

I. Instructions:

1. Client case study is to be submitted to your clinical teacher on the specified date due and should incorporate the content listed in this guide.

2. Resources for use in preparing this case study should include:

   a. The client, his family and friends (if possible).
   b. A minimum of three periodical references.
   c. Members of hospital psychiatric health team familiar with client's case.
   d. Clinical teachers.

3. Use client's initials only.

4. Pre-inform clinical teacher of name of case study client.

5. Use headings listed below as the format of your presentation.

6. Please organize case study material so that it does not exceed ten (10) pages in length. If you feel there may be a problem with this limitation, discuss it with your clinical instructor at the earliest possible date.

II. Content of case study:

1. Specific data: (.5)

   a. Client name (initials only)
   b. Age
   c. Marital status
   d. Occupation
   e. Predominate pattern of behavior (i.e. depressed, withdrawn, etc.)
   f. Current diagnosis
   g. Prognosis

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2. Events precipitating current hospitalization. (.3)

3. Brief social and cultural history of client, including work, military background, education, significant persons in client's life, and prior adjustments to life situations. (1.5)

4. Current treatment plan (how is your client being treated for his illness at this time - include goals and client reactions). (1)

5. Client's current insight into his illness and hospitalization. (.5)

6. Hypothesize what factors were causal in this client's psychopathology and what assets might enable the client to be restored to wellness or what liabilities may deter recovery. (1.5)

7. Formulate a nursing care plan based on the "Basic Needs Approach". Identify the client's need in order of priority. Include discharge plans and criteria for discharge. (Use attached sheets.) (Refer to Criteria for Nursing Care Plan - pg. 19) (2.7)

8. Briefly comment on your reaction to this client (negatively or positively) and include insights you gained in terms of self-insight and self-understanding. (1.5)

9. Bibliography - Include at least three (3) periodical references using proper bibliography format (.2)

10. Overall appearance of paper, i.e. grammar, spelling, and sentence structure. (.3)

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Illustration 4

FINGER LAKES COMMUNITY COLLEGE
Department of Nursing
NUR 204

Spring Session

CLINICAL PERFORMANCE CONTRACT

Legend: S - Satisfactory: Objective has been met.
U - Unsatisfactory: Objective has not been met.
NO - No opportunity/or not observed.
* - Objective must be met satisfactorily by the end of NUR 204.

The instructor may maintain weekly anecdotal records to assess whether you have met the criteria outlined in the clinical contract. Data may also be obtained from staff members. The purpose of this is to guide you in your learning as well as to evaluate you.

Student Name: _____

Semester: _____

Hospital: _____

Instructor: _____

The following overall criteria will be met for satisfactory clinical performance in NUR 204:

EXPECTED BEHAVIOR	**EVALUATION**		
*1. Punctual at clinical facility	NO	S	U
*2. Prepared to meet clinical objectives.	NO	S	U
3. Active participation in pre- and post-conference.	NO	S	U
4. Attend all sessions of clinical lab (See Nursing Dept. policy regarding clinical absence.)	NO	S	U

*5. Keep a written "log" of each clinical experience according to prescribed instruction and hand in same to clinical instructor. NO S U

*6. Demonstrate in writing a Process Recording on the forms provided and hand in to clinical instructor. NO S U

*7. Complete a written care plan utilizing the form provided and hand in to clinical instructor. NO S U

*8. Write a Case Study according to specific instructions on a selected client and submit to clinical instructor. NO S U

EXPECTED BEHAVIOR **EVALUATION**

*9. Complete a group field project to be done independently and report orally on selected project. NO S U

*10. Sucessfully complete medication skill competencies. NO S U

■ ROLE AS PROVIDER OF CARE ■

■ ASSESSMENT ■

The student will:

EXPECTED BEHAVIOR **EVALUATION**

1. Collect client data via direct observation, interview review of medical information and other appropriate resources. NO S U

2. Collect data concerning problems related to psychiatric diagnosis, including concurrent medical problems. NO S U

3. Sort and organize assessment data according to Maslow's needs and developmental stage. NO S U

4. Survey client record in order to obtain background information for "Client Study."	NO	S	U

■ DIAGNOSIS ■

*1. Interpret deviations from normal related to client needs.	NO	S	U
*2. Identify nursing diagnosis based on comprehensive assessment data.	NO	S	U

■ PLANNING ■

1. Develop with the client, family, significant others, and/or members of the health care team short- and long-term client-centered goals related to the nursing diagnosis.	NO	S	U
*2. Prioritize nursing diagnosis based on psychological status.	NO	S	U

Illustration 5

FINGER LAKES COMMUNITY COLLEGE
Nursing 100

CRITERIA FOR EVALUATION OF STUDENT PERFORMANCE

STERILE DRESSING - 30 minutes
Start: _____ Finish: _____

Name of Student _____

S U

Instructor's Comment

1. Follows medical order.

2. Has necessary equipment and materials at bedside before removing soiled dressing.

3. Applies principles of asepsis when:

   a. Handling equipment.
   b. Removing the dressing.
   c. Cleaning wound area and applying medication if ordered.
   d. Applying dressing.
   e. Caring for equipment after use.

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4. Applies dressing securely.

5. Maintains universal precautions.

Grade Date Instructor Student

1. _____

2. _____

3. _____

Contributors

Suzanna R. Engman Benedict, Instructor of English, has been with Finger Lakes Community College since 1993.

Marylou Boynton, Associate Professor of Social Science, has been with Finger Lakes Community College since 1985.

Carol Freeman, Associate Professor of Mathematics, has been with Finger Lakes Community College since 1993.

Linda Hobart, Professor of Physical Science, has been with Finger Lakes Community College since 1979.

Deborah Massey, Assistant Professor of Chemistry, has been with Finger Lakes Community College since 1991.

Ann Robinson, Associate Professor of Nursing, has been with Finger Lakes Community College since 1986.

Carol Urbaitis, Dean of Student Services, has been with Finger Lakes Community College since 1991.

Kim Wager, Instructor of Mathematics, has been with Finger Lakes Community College since 1991.

FINGER LAKES
COMMUNITY COLLEGE

4355 Lake Shore Drive
Canandaigua, NY 14424-8395
(716) 394-3500 • FAX (716) 394-5005

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